



Watson, R., Wilson, H. N., Smart, P., & Macdonald, E. K. (2018). Harnessing Difference: A Capability-Based Framework for Stakeholder Engagement in Environmental Innovation. *Journal of Product Innovation Management*, 35(2), 254-279.
<https://doi.org/10.1111/jpim.12394>

Peer reviewed version

Link to published version (if available):
[10.1111/jpim.12394](https://doi.org/10.1111/jpim.12394)

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HARNESSING DIFFERENCE: A CAPABILITY-BASED FRAMEWORK FOR STAKEHOLDER ENGAGEMENT IN SUSTAINABILITY INNOVATION

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As first Submitted to Journal of Product Innovation Management, May 2015

ABSTRACT

Sustainability innovation can simultaneously deliver benefits for the natural environment, and a firm's wider community of stakeholders, including customers, as well as creating market opportunities that lead to long-term business success. However, it is not easy to do since it involves engagement with diverse external and internal stakeholders and new capabilities to extract value from such novel interactions. Through a systematic review of 97 papers, a framework is developed of the *integrative capabilities* organizations require to engage with their stakeholders for sustainability innovation. Extending prior resource-based new product development literature, the dimensions of external and internal integrative capabilities are elaborated. Furthermore, two higher-order integrative capabilities are identified as *value framing* and *systematized learning*. Value framing enables organizations to understand the alternative value frames of their stakeholders, and co-create unique solutions that harness their differences. Systematized learning describes how an organization institutionalizes what it learns from its stakeholder engagement to improve future practice. The review suggests that sustainability professionals are leading the development of these integrative capabilities due to the distributed nature of sustainability as a functional capability, but that organizations could improve their stakeholder engagement by enhancing and developing integrative capabilities within their marketing and innovation functions.

Keywords: Sustainability innovation; stakeholder engagement; capabilities; institutional logics; value frames

INTRODUCTION

Stakeholder engagement has commonly been understood to be a transactional process whereby managers learn what is important to their various stakeholder groups, process this information internally, and try to reconcile the stakeholders' divergent interests (Hill and Jones, 1992). However, there is a growing recognition that external stakeholders can be valuable sources of innovation for organizations, and research into open innovation is exploring how firms can leverage this to their advantage (West et al., 2014).

Open innovation research focuses on how innovation is sourced from external agents, but has largely overlooked how this insight is integrated into businesses (West and Bogers, 2014). The exceptions have mostly been from an absorptive capacity perspective (following Cohen and Levinthal, 1990), which evidence the overall importance of utilising external knowledge, but focus on quantifying the relationship between this ability and internal R&D capabilities, rather than elaborating the broader competencies and culture an organization requires to integrate innovation from external sources (West and Bogers, 2014).

A starting-point for understanding integrative capabilities was provided by Verona (1999), who highlighted their importance in new product development. He outlined the external integrative capabilities by which a firm absorbs critical knowledge and resources from external sources, and the internal integrative capabilities it uses to blend the technical capabilities developed in functional areas (Verona, 1999). His resource-based model emphasized the relationship between individuals within an organization and the organizational capabilities they leverage as a key driver of successful product innovation. This model provides a foundation on which to build an understanding of how firms integrate insight from external sources, but it merits revisiting in the light of more recent developments in both theory and practice. First, from a contemporary theoretical perspective it is appropriate to view these integrative capabilities as dynamic capabilities, given the current pace of change in both the business and the natural environment and the extent to which these require continual resource reconfiguration (Hart, 1995).

Second, research into open forms of innovation (Chesbrough, 2012; von Hippel, 2005; West et al., 2014), and the notion that businesses and customers can work together to co-create products and markets (Nonaka, 1991; Payne et al., 2008), means that collaborating with customers and other stakeholders is increasingly seen as a way to improve idea generation and concept development, resulting in products that are more highly valued by customers (Roberts and Candi, 2014). Third, work on innovation is widening in scope to incorporate process and business model innovation (Johnson and Christensen, 2008) as well as product and service innovation, and to consider more diverse sources of innovation including individuals, customers, suppliers or universities (see West and Bogers, 2014 for a recent review).

We define environmental sustainability innovation as a significant and novel change to the content or configuration of the value proposition offered by a firm, where such change reduces a negative environmental impact or creates an environmental benefit. This definition follows previous reviews' definitions of sustainability-oriented innovation (Adams et al., 2012) and sustainability-led innovation (Klewitz and Hansen, 2014; Seebode et al., 2012), without requiring the environmental benefit to be the dominant motivation for innovation. While social sustainability innovation can be similarly defined, we restrict our formal attention to environmental sustainability benefits in the interests of focus; however our review does include innovations with triple-bottom-line objectives relating to both social and environmental benefits.

Environmental sustainability innovation, or sustainability innovation as we will term it for brevity, is a relevant context within which to develop such an enriched model for stakeholder engagement in innovation, since it embodies all three of the developments referred to above. It addresses rapid changes in both the business and natural environment. It requires the consideration of multiple stakeholders with different ways of valuing success (Driessen and Hillebrand, 2013; Polonsky et al., 1998). It demands innovation which moves beyond product and process innovation to business model innovation, even “entailing the alteration of social norms and cultural values” (Yarahmadi and Higgins, 2012, p. 401), and as such often involves expertise

sourced through external collaboration (Albino et al., 2012; De Marchi et al., 2013). It is critically important in practice, since resource scarcity (evidenced by commodity prices which increased by nearly 150% from 2002 to 2010, erasing a century's worth of real price declines (World Economic Forum, 2014)), coupled with stakeholder pressure to address environmental issues, mean more organizations are pursuing sustainability innovation as a way to achieve environmental and economic outcomes simultaneously.

The literature relating to stakeholder engagement for sustainability innovation is, however, disjointed and widely distributed across journals and methodological approaches . Related reviews have found that interaction with external sources such as customers and research institutes can increase the capacity of SMEs to deliver sustainability innovations (Klewitz and Hansen, 2014), but that SMEs lack this important relational ability with external stakeholders (del Brío and Junquera, 2003). Other reviews identify market and legal knowledge, inter-functional collaboration and innovation-oriented learning as critical for sustainable product innovation (de Medeiros et al. 2014) and provide guidance on sustainability innovation under the headings of “collaborations and relationships” and “knowledge management” (Adams et al., 2012). A recent study examines the role of external integrative capabilities in incorporating sustainability issues into new product development (Dangelico et al., 2013). However, a synthesis is required about the capabilities a firm requires to translate stakeholder engagement into sustainability innovation, and in which functional areas of the organization these capabilities exist or can be developed.

We therefore conduct a systematic literature review of 97 papers in this field, and use analytic induction (Bansal and Roth, 2000) to iterate between the emerging framework, starting with Verona's (1999) model, and the data gathered to create an updated and extended framework, which describes the integrative and functional capabilities required to engage stakeholders effectively in sustainability innovation (shown at Figure 1).

We provide further granularity to the dimensions of internal integrative and external integrative capabilities (together, dynamic integrative capabilities), but find that the literature goes

beyond the processes and structures which dominate Verona's (1999) original model, to discuss how to achieve trust, cooperation, and a shared vision with stakeholders. We therefore identify a new, 'higher order' (Collis, 1994) integrative capability which we term "value framing". Firms use this capability to navigate between the different ways of seeing the world that exist between social groupings. Instead of seeing these differences as unassailable conflict, or opposing positions which have to be negotiated to a compromise, teams drawing on a value framing capability can think about the complete system operating beyond the immediate boundaries of the innovation context. They can empathize with the alternative value frames of their collaborators, and co-create innovative solutions that put those differences to positive use by rethinking the problem, or combining competencies in new ways; in other words, by harnessing difference.

Organizations which have a value framing capability also have the potential to achieve higher order learning (Quist and Tukker, 2013) because they are able to question the existing boundary conditions, frames or assumptions of a problem. If they can systematize what they learn from value framing activities on individual innovation projects by sharing that learning across the organization, and by reconfiguring their human and capital resources accordingly, then the organization is learning to learn and enabling the continuing development of its stakeholder engagement capabilities. There is therefore a strong link between value framing and what we have termed "systematized learning".

As well as identifying these two higher order integrative capabilities, we add sustainability as a functional capability to our framework (alongside marketing and innovation) and depict a two-way interaction between these functional and the previously discussed integrative capabilities. Currently, sustainability professionals tend to be leading the development of integrative capabilities due to the distributed nature of the sustainability as functional capability (for example sustainability specialists embedded in other functions, cross functional sustainability working groups, specialists in green technologies and employees acting as 'green champions'). However, organizations could improve their stakeholder engagement by enhancing and developing

integrative capabilities within their marketing and innovation functions, for example by sharing customer insight into sustainability.

The next section details the systematic review method. We then introduce our capabilities-based framework, and use it to structure our synthesis of the literature. Finally we discuss our findings and their implications for managers and innovation teams, and propose research directions.

METHOD

We conducted a comprehensive synthesis of the academic literature relating to stakeholder engagement in sustainability innovation using Tranfield et al.'s (2003) systematic review approach. Inspired by medical systematic reviews, this approach allows other researchers to replicate and update the literature review by providing a transparent account of the reviewer's procedures. Our review focused on the question: *How do firms engage with their stakeholders to enable sustainability innovation?* The review proceeded in three steps as follows.

Searching

We searched for relevant studies in the scientific literature represented by peer-reviewed journals. An initial scoping of the literature, including previous related reviews, identified the keywords to use when constructing search strings (detailed in Table 1).

Insert Table 1 about here

We searched two leading electronic databases, ESBCO and ABI/INFORM, for articles whose titles and/or abstracts contained at least one of the search terms from all four themes, by linking the strings in Table 1 with the Boolean operator (AND). In this way, we identified articles addressing the concept of sustainability innovation in conjunction with that of stakeholder engagement. This search across both databases resulted in a total of 1,079 titles.

Screening

An initial screening of article titles and abstracts, informed by the inclusion and exclusion criteria in Table 2, led to the retention of 106 articles. 13 of these were rejected as they were published in journals with an SSCI 2014 impact of less than 1. A further 10 articles were rejected on the basis of relevance and one on the basis of quality. 15 additional papers were sourced from the authors' prior reading, cross-referencing and snowballing from database-sourced articles. 97 articles were therefore retained for full review.

Insert Table 2 about here

Extraction and synthesis

Information from these 97 articles was summarized in an Excel spreadsheet organized under descriptive, methodological and thematic categories. The data from the selected papers was heterogeneous, coming from multiple contexts and a mixture of empirical (qualitative and quantitative) and conceptual papers. We therefore used a qualitative cross-case analysis approach to synthesis, each paper being equivalent to a case (Mays et al., 2005). We developed a conceptual framework of the capabilities required for firms to engage with their stakeholders to drive sustainability innovation, using an existing product development model as a starting-point (Verona, 1999). Using analytic induction (Bansal and Roth, 2000) we moved iteratively between the emerging framework and the data to identify and elaborate the underlying dimensions of these capabilities, resulting in the framework shown in Figure 1.

RESULTS: DESCRIPTIVE ANALYSIS

Journals and rankings

As with related reviews (Adams et al., 2012; Klewitz and Hansen, 2014), we found the literature to be disjointed and widely distributed. Consistent with an immature body of literature, the 97 articles come from 42 separate journals, 26 of which provided one article each. Journal of Cleaner Production and Business Strategy and the Environment together published almost a third of the

studies, with 42 articles overall in environmental or ethical journals. There were additional clusters in innovation/R&D related (16) and marketing related (11) journals. Research interest is increasing, with 59 articles published in 2010 or later.

Insert Table 3 about here

Type of innovation

Klewitz & Hansen (2014) identify three types of sustainability-oriented innovation: product innovation, involving improved or new products/services; process innovation relating to the production of goods and services that increase eco-efficiency; and organizational innovation dealing with “people and the organization of work” (OECD, 2005, p. 55). By this classification, 30 studies address product innovation and 16 organizational innovation, with only 11 considering process innovation. 40 address sustainability innovation generally across all three types.

Type of research

The majority of empirical studies are qualitative (48), ranging from single case studies to 47 cases. Quantitative studies (22) tend to be based on secondary innovation surveys such as the EU Community Innovation Survey, but also include questionnaires. Very few studies are longitudinal, even though analysing the effects of stakeholder engagement on innovation might better be studied in this way (see Le Ber & Branzei, 2010a; Horbach, 2008 for exceptions). Seven studies use mixed methods and the remaining 20 are conceptual.

Type of stakeholder

66 articles deal primarily with external stakeholder engagement. Many of these address external stakeholders generally, with users/consumers and NGOs most frequently researched as single stakeholder groups (Table 4). 31 consider engagement with internal stakeholders, typically looking at collaboration between functional teams or departments.

Insert Table 4 about here

RESULTS: A CAPABILITY-BASED FRAMEWORK

See Figure 1. We first outline the framework before discussing its elements in more depth. Organizational capabilities are “the socially complex routines that determine the efficiency with which firms transform inputs into outputs” (Collis, 1994, p. 145). Capabilities can directly improve the efficiency of current operations, and also allow firms to conceive of new ways to create value. Organizational capabilities have been categorized into a hierarchy of functional, dynamic and higher order capabilities (Collis, 1994; Winter, 2003). Functional capabilities represent the basic technical capabilities a firm needs to “earn a living now” in its current state of equilibrium. Dynamic capabilities are “the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments” (Teece et al. 2007, p.516), including changes in the natural environment (Hart, 1995). They deliver improvements to the firm by accessing, using and reorganizing resources and recognizing their intrinsic value before competitors (Collis, 1994). Finally, higher order capabilities allow firms to create and modify dynamic capabilities, or ‘learn to learn’, thereby reducing the time taken to address a competitive disadvantage.

Integrative capabilities absorb critical knowledge and resources from external sources and blend the technical capabilities developed in various functional areas (Verona, 1999). These integrative capabilities can be construed as dynamic capabilities since they are deployed by organizations to access and utilise external knowledge, expertise and resources, and combine them effectively with internal resources. Our approach follows Verona (1999) in that both agents and the organizational capabilities they leverage affect innovation outcomes, but extends the consideration of agents to external stakeholders as well as internal teams and individuals. Our framework maintains Verona's (1999) distinction between functional and integrative capabilities; however, we add sustainability as a functional capability (alongside marketing and innovation) and depict a two-way interaction between functional and integrative capabilities. We define and elaborate the dimensions of external and internal integrative capabilities and also reveal two

additional higher order integrative capabilities which enable organizations to continuously learn how to improve and modify their integrative capabilities. Finally, the scope of innovation outcomes considered extends beyond new product development to process and organizational innovation.

Insert Figure 1 about here

Integrative capabilities

We begin our detailed discussion with integrative capabilities. Our review provides further granularity and examples of *dynamic integrative capabilities*. We also evidence two interrelated *higher order integrative capabilities*: value framing and systematized learning.

Dynamic integrative capabilities

Dynamic integrative capabilities comprise external integrative and internal integrative capabilities. Firms absorb functional knowledge through the use of external integrative capability; internal integrative capability then organizes its use. We redefine and provide further granularity to the dimensions of these capabilities articulated by Verona (1999), and find that much of the literature relating to external integration goes beyond the process, structures and systems she presents, to talk about how stakeholder interactions should be managed in order to achieve ongoing trust and cooperation, and how sharing experiences and creating a shared vision between stakeholders is critical for external integration.

External integrative (see Table 5). This capability is required by firms to access knowledge and other resources from these external stakeholders, since research has shown that sustainability innovation requires greater engagement with external stakeholders (Albino et al., 2012; Horbach, 2008; Klewitz and Hansen, 2014; De Marchi, 2012; De Marchi et al., 2013). 66 of our reviewed papers deal primarily with external integration, from which we identify three dimensions of this capability: *building bridges, managing engagement, and achieving alignment*.

Building bridges. Firms often use third party organizations to act as intermediaries with stakeholder groups (Hansen and Klewitz, 2012; Murphy and Arenas, 2011). This "enables organizations to monitor, sense and interact with environmental forces, and to transfer information across boundaries" (Hoffmann, 2007, p. 329). For example, Stafford et al. (2000) provide a fascinating account of Greenpeace's role as a "strategic bridge" between a manufacturer of household appliances and its stakeholders to enable the development of a more environmentally friendly refrigerator. Firms also make use of networks to perform this bridging function. These can be internal to the firm, such as expert panels and stakeholder advisory boards (Hansen and Grosse-Dunker, 2009), or external to the firm, involving knowledge institutions (Triguero et al., 2013), supply chain partners (Roy and Whelan, 1992) and governments (Holweg, 2014; von Malmborg, 2007). A few studies recognize the importance of the individuals who play this bridge-building or boundary-spanning role (Hoffmann, 2007; Holmes and Smart, 2009; Murphy and Arenas, 2011).

Managing engagement. Firms must engage with stakeholders in a way that encourages ongoing cooperation and trust. Key requirements include regular interaction, direct and open communication, non-hierarchical dialogue, allowing diverse points of view to be explored, empowerment, and transparency (Heiskanen and Lovio, 2010; Hoffmann, 2007; Jamali et al., 2011; Mathur et al., 2008; McDonald and Young, 2012; Spena and De Chiara, 2012). Users in particular need to be better incorporated into design processes (Liao et al., 2013; Sakao and Fagnoli, 2010).

Achieving alignment. Aligning the goals of cross-functional and inter-organizational project teams through mechanisms such as creating a shared vision, identification of multiple overlapping benefits, sharing experiences, and involving the right individuals were found to be critical for external integration (van Bommel, 2011; Lee and Kim, 2011; Senge et al., 2007; Verghese and Lewis, 2007).

Internal integrative (see Table 6). This capability enables external stakeholder engagement to be combined with internal stakeholder collaboration to achieve sustainability innovation (Ayuso et al., 2006, 2011; van Bommel, 2011; Driessen and Hillebrand, 2013; Lenox and Ehrenfeld, 1997; de Medeiros et al., 2014). Fewer articles (31) in our review deal primarily with internal stakeholders, however these articles identify three dimensions of internal integration capability: *structuring teams and engaging employees, using environmental data, and integrating sustainability*.

Engaging employees. Employee engagement in sustainability innovation can be influenced by the composition of teams (Bocken et al., 2014), and how business units and reporting lines are set up (Kiron, 2012; Kiron et al., 2013; Kruschwitz and Pflueger, 2012) as well and the level of support provided by leaders and senior management (Bos-Brouwers, 2010; Kiron, 2012). The time and support employees receive to elaborate on innovative ideas also enables sustainability innovation (Bos-Brouwers, 2010).

Using environmental data. Gathering and sharing environmental information using tools such as web-based software platforms, databases, design aides and environmental management systems (EMS) helps firms identify opportunities for sustainability innovation and facilitate the internal collaboration required to implement them (Favi et al., 2012; Gmelin and Seuring, 2014; Hallstedt et al., 2010; Horbach, 2008; de Kraker et al., 2013; Lenox and Ehrenfeld, 1997). However, they should be aware that EMS can steer organizations towards the exploitation of present production systems rather than discontinuous innovations (Könnölä and Unruh, 2007), and reinforce a siloed approach to environmental issues (Knowles and Espinosa, 2009).

Integrating sustainability. Sustainability innovation requires collaboration between functions such as marketing, R&D/innovation, operations, and sustainability/corporate responsibility (Carrillo-Hermosilla et al., 2010; Dangelico and Pujari, 2010; Driessen and Hillebrand, 2013; Knowles and Espinosa, 2009; de Medeiros et al., 2014; Pujari, 2006; Pujari et al., 2003, 2004).

This can be achieved by integrating sustainability criteria into processes such as strategy development, product development, marketing, and performance management across functions. Specific examples include integrating environmental impact analysis with marketing practices such as market research (Pujari et al., 2004) and including green issues in new product development procedures (Driessen and Hillebrand, 2013).

Insert Table 6 about here

Higher order integrative capabilities

Our review identifies two higher order integrative capabilities by which a firm learns to learn from its interactions with stakeholders - *value framing and systemized learning*.

Value framing (see Table 7). This capability is required to navigate between the different ways of seeing the world which exist between different social groups. These broad cultural templates are known as ‘value frames’ (Le Ber and Branzei, 2010), or where the template arises from the social group’s allegiance to a different institutions, ‘institutional logics’ (Friedland and Alford, 1991). These value frames provide actors with values, organizing frameworks and legitimate practices to guide their behaviour in a social context (Meyer and Hammerschmid, 2006). Research shows that multiple institutional logics may impose different, and potentially conflicting demands on organizations (Oliver, 1991), and has considered how organizations deal internally with institutional pluralism in hybrid organizations which “combine different institutional logics in unprecedented ways” (Battilana and Dorado, 2010, p. 1419).

Although those making the ‘business case’ for corporate social responsibility (CSR) (Porter and Kramer, 2006, 2011) suggest that aspects of CSR, such as environmental sustainability, are complementary with the traditional commercially driven business models, many actors still perceive CSR as a trade-off with mainstream business objectives and activities (Barnett, 2007). So, by introducing sustainability criteria into the innovation process, inconsistencies are likely to

occur between the value frames of social groupings with a commercial or a customer-centric value frame and those whose value frames are more oriented to social or environmental outcomes.

A subset of the institutional logics literature looks at the implications of these competing logics coexisting in the same time and space. Jay (2013) found that hybrid organizations combine “the logics of government bureaucracies, business firms and non-profit associations” (p. 137) in their efforts to generate innovative solutions to complex problems. Bondy and Wilson (2013) document how individual actors are agents for change in institutional logics by virtue of the decisions they make between the philosophies and practices of different logics, whilst Reay and Hinings (2009) highlight the actions individual actors take to manage competing logics through collaborative relationships.

The reviewed literature complements this work by reporting differences in value frames between firms and their external stakeholders (Le Ber and Branzei, 2010; Holmes and Smart, 2009; Holweg, 2014; Senge and Carstedt, 2001) as well as between departments within the firm (Aschehoug et al., 2012; Delmas and Terlaak, 2001; Guiltinan, 2009; Lenox and Ehrenfeld, 1997). The broad picture that emerges is that organizations need to proactively manage these competing value frames. We identify three dimensions of this value framing capability: *thinking systemically*, *empathizing*, and *hybridizing*.

Thinking systemically. First, managers need to be able to consider the interests of the complete system of relevance to the innovation, both within the organization and beyond its boundaries (Senge et al., 2007). Internally, differences in value frames between departments can hinder or limit the scope of sustainability innovation (Driessen and Hillebrand, 2013; Pujari et al., 2003), for example, more sustainable design practices are “likely to be somewhat constrained by corporate and marketing realities and perceptions” (Guiltinan, 2009, p. 20). This means an organizations’ senior managers need to set a purpose for sustainability innovation that is greater than the individual agendas of its internal functions. Externally, thinking systemically means “focusing on issues that are larger than individual organizations and improving the related systems

that can benefit all" (Senge et al., 2007, p.52). For example, automotive firms may need to shift their attention from individual company needs (such as subsidies) towards the collective needs faced by all industry players, in order to progress towards a more sustainable future for the industry (Holweg, 2014).

Empathizing. Organizations must also create the time and space to reflect on the differences in value frames between themselves and their stakeholders, independently and in dialogue with those stakeholders. Senge et al. (2007) describe this as “relational work” which involves “moving beyond ‘politeness’ or win-lose debates into more authentic and reflective interactions characterized by candour, openness and vulnerability” (p. 47). This includes listening openly to stakeholders, without applying filters that may be associated with the listener’s own value frame. For example, Aschehoug et al. (2012) found that the cultural frame of a department affected the way it responded to environmental information available from external stakeholders, resulting in a substantial gap between the information available and what the firm actually knew. In similar vein, Hoffmann (2007) reported that the ability of a company to learn from customer involvement in sustainable product development was limited by filtering mechanisms constraining the company to information considered important by the recipient.

Hybridizing. Previous research has considered how hybrid organizations combine different institutional logics (Battilana and Dorado, 2010; Jay, 2013; Reay and Hinings, 2009). Commercial organizations striving to incorporate sustainability goals into their conventional business models also need to reconcile competing logics through a process of ‘hybridizing’ the logics of different internal stakeholders (Bondy and Wilson, 2013) and the logics of the external stakeholders with whom they are engaging. Our review suggests two stages to this: acknowledging organizational tensions and co-creating appropriate solutions.

Acknowledging tension between value frames is as an essential capability to facilitate radical thinking around new solutions to existing problems (Driessen and Hillebrand, 2013). If a partnership process is conceptualized as fundamentally non-conflictual in nature this “risks the de-

legitimization of conflictual approaches to environmental action, and a retreat from radical thinking and innovative environmental solutions” (Poncelet, 2001). As Nonaka (1991) observes, “the confusion created by the inevitable discrepancies in meaning that occur in any organization might seem like a problem. In fact, it can be a rich source of new knowledge – if a company knows how to manage it” (p. 167).

Once this tension is acknowledged, stakeholders can then co-create solutions which deliver benefits to all parties involved, where co-creation means working together to redefine what is valued and expected or desired on an individual and collective basis (Vargo and Lusch, 2011). Le Ber & Branzei (2010) describe this hybridization process, which they term ‘value frame fusion’ as stakeholders initially contrasting their divergent understanding of a problem (‘diagnostic frames’) and then working together to deliberately develop a partnership-specific understanding of possible solutions (‘prognostic frame’). Reay and Hinings (2009) identify four mechanisms for managing the rivalry of competing logics – all of which allow the logics to co-exist by facilitating and strengthening the identities of separate actors, but also developing collaborative relationships between them.

Insert Table 7 about here

Systemized learning (see Table 8). The second, and interconnected, higher order integrative capability is systemized learning. This capability enables external stakeholder engagement techniques and internal collaboration mechanisms to develop into an organizational capability by incorporating them into the fabric of the organization as the result of a learning process (Driessen and Hillebrand, 2013). Systemized learning allows firms to use knowledge and experience gained from individuals or discrete projects to change future action and reconfigure resources at the organizational level. Systemized learning therefore involves transferring individual and tacit knowledge into explicit organizational knowledge that can be shared among many individuals (Nonaka, 1991): “Even if individuals are interpreting things of relevance, their learning needs to

be integrated and institutionalized to realize its future value” (Crossan et al., 1999, p. 534). We infer three broad dimensions from the limited literature relating to this capability: *accumulating experiences*, *reconfiguring resources* and *institutionalizing success*.

Accumulating experiences. Organizations learn to integrate multiple stakeholder issues over time by accumulating experiences, making this capability difficult to build overnight or copy (Driessen and Hillebrand, 2013). These experiences can be from individuals within the firm, from previous innovation projects, and from benchmarking what other companies are doing. Rather than the insight residing only with the team which owns that stakeholder relationship (e.g. sustainability teams for NGOs, marketing for customers, and public affairs for policymakers), firms need to be able to aggregate this learning at an organizational level.

Reconfiguring resources. The organization responds to this accumulated experience by reconfiguring resources, both human and capital. This may involve reconfiguring the supply chain to enable reverse logistics for end-of-life product take-back, or changing the organizational structure. For example, in early 2014, the Sustainable Business and Innovation function of NIKE Inc. became part of the company’s main Innovation function, with its vice-president reporting both to the President of Innovation and to the CEO (<http://about.nike.com/pages/sustainability>). This type of reorganization represents a recognition at the organizational level of the need to recombine human resources, as against a project-by-project approach of putting the right internal teams in place.

Institutionalizing success. Finally, organizations must learn to share this learning across the organization by reflecting on what works with respect to stakeholder engagement, and sharing and embedding that across the organization, albeit not in such a rigid way as to reduce the opportunity for future learning. For example, Unilever’s website suggests that at Unilever this includes “investing in leaders’ competences and skills to enable success in the current and future complex and connected stakeholder world,” and developing online resources including case studies and best practice guides relating to sustainability initiatives (www.unilever.com). Reay and Hinings (2009)

propose that rivalry between competing logics is resolved through collaboration at micro levels but that is “possible to create new institutional arrangements where more than one logic guides the behaviour of actors within an organizational field” (p. 647).

Insert Table 8 about here

Functional capabilities

Functional capabilities represent the basic technical capabilities a firm must develop in support of sustainability innovation. In Verona's (1999) model these are marketing and technological capabilities. In our review, sustainability capabilities naturally emerge as a third category of functional expertise, and we redefine technological capabilities as innovation capabilities.

Sustainability capabilities. Three core sustainability capabilities are identified. The first is *providing sustainability expertise*, for example relating to clean technology and manufacturing processes (Dangelico and Pujari, 2010). The second is *monitoring and communicating sustainability performance*, which includes environmental benchmarking and performance target setting and measurement processes, environmental database management (Pujari et al., 2003), and internal and external reporting and communication. Finally, *championing sustainability* takes such forms as building businesses cases, providing cross functional project management (Pujari et al., 2003), and influencing employees and decision-makers. We observe that although in many organizations the ‘sustainability’ is a centralized functional team (CSR, environment or sustainability team), it is also a distributed capability which is located within other departments across the organization. This may take the form of sustainability steering groups or working groups composed of representatives from multiple functions; sustainability or environmental specialists embedded in other functions such as product development, marketing/communications, supply chain, operations and property; and employees acting informally as ‘green champions’ across the organization.

Innovation and marketing capabilities. Innovation capabilities comprise the core operational skill set for conceiving, developing and manufacturing/implementing more sustainable new products and/or services. Following Oke (2010) they can be broadly categorised into *developing strategy, creating and prioritising ideas, implementing projects* and *creating an enabling culture*. Similarly, the review does not suggest that core marketing capabilities are sustainability specific; hence after Daniel et al., (2003) we list these as *defining markets and understanding value, creating value propositions* and *communicating value*.

Interaction between capabilities

The framework depicts a two-way interaction between functional capabilities and the integrative and higher order capabilities. Some integrative capabilities are functionally led: for example, members of sustainability teams would usually participate in external networks addressing environmental issues. Other activities that might traditionally be seen as functional, such as a customer focus group relating to a sustainable product, could also be conceptualised as externally integrative (with consumers), as well as being internally integrative if the resulting insights are shared beyond the marketing team.

The authors' field-based experience suggests that sustainability professionals are currently leading the development of integrative capabilities due to the distributed nature of the sustainability capability (in the form of green champions or cross-functional working groups). However, organizations could improve their stakeholder engagement by enhancing and developing integrative capabilities within their marketing and innovation functions, for example by sharing customer insight into sustainability.

Outcomes of sustainability innovation

Finally, our framework summarizes outcomes of sustainability innovation. The literature discusses a range of business and societal outcomes which are expected to flow from three broad categories of sustainability innovation - product, process and organizational (Klewitz and Hansen, 2014),

summarised in Figure 1. Strikingly, however, there was no empirical evidence in our review of the link between capabilities and outcomes. Different types of sustainability innovation may demand different capabilities, depending on the complexity and diversity of the stakeholder perspectives which need to be integrated into decision making. Existing categorizations of sustainability innovations may be of limited use in defining the capabilities required. For example, some process innovations may be wholly in the firm's control, whereas others may involve multiple supply chain partners, and some product innovations may be simple and easily understood by customers (e.g. recycled kitchen towel), or very complex requiring changes to national networks and consumer behaviour patterns (e.g. electric cars). An opportunity exists then to clarify the link between the types of sustainability innovation and the capabilities they require.

DISCUSSION

We respond to recent calls to “develop a theory and evidence about the development and application of competencies for integrating innovation from external sources” (West and Bogers, 2014, p.9). We build a framework detailing the integrative and functional capabilities organizations use to engage with stakeholders to enable sustainability innovation. We identify and elaborate dimensions of these capabilities with examples from the extensive literature reviewed (Tables 5-8).

Taking a dynamic capabilities perspective which construes integrative capabilities as dynamic capabilities because they enhance “the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments” (Teece et al. 2007, p.516), and situating our research in the sustainability innovation context because it embodies research interest in open forms of innovation (West et al., 2014), co-creation (Payne et al., 2008), and the broadening of scope of innovation (Johnson and Christensen, 2008), we reveal insights which contribute to an understanding of how firms engage with their stakeholders to enable sustainability innovation.

We find that there are two classes of integrative capabilities - *dynamic* and *higher order* (Collis 1994). Our systematic review provides further granularity and examples of dynamic integrative capabilities. However our major contributions are to evidence two interrelated higher order integrative capabilities, *value framing* and *systematized learning*, and to identify a two-way interaction between the integrative and functional capabilities within an organization, which may help build understanding of how integrative capabilities are developed in practice. We now discuss these contributions in more detail.

Value framing. Our first contribution is to identify the new, higher order integrative capability of ‘*value framing*.’ Firms use this capability to navigate between the different ways of seeing the world that exist between different social groupings. Instead of seeing these differences as unassailable conflict, or opposing positions which have to be negotiated to compromise, firms with a value framing capability can think beyond the immediate boundaries of the innovation context they are looking at, learn to really understand the alternative value frames of their potential collaborators, and co-create innovative solutions which harness those differences by rethinking the problem, or combining competencies in new ways.

Our review included papers addressing the ‘value frame fusion’ which occurs in cross-sector relationships between firms and NGOs (Le Ber and Branzei, 2010; Holmes and Smart, 2009). However more research is needed to classify and explore the instances of competing value frames which arise between firms and other external stakeholder groups, and between functional groups within the firm, and to understand what is done at an individual, group and organizational level to navigate these differences. It would also be useful to evaluate how a company’s institutional approach to stakeholder integration is interpreted and implemented at the project level. Most of the papers in this review take the firm as their unit of analysis (see Dangelico and Pujari, 2010; Dangelico et al., 2013; Heiskanen and Lovio, 2010; Hoffmann, 2007 for exceptions), suggesting an assumption that an organization’s stakeholder engagement approaches are implemented consistently across the organization. This assumption could be researched by looking at how

capabilities manifest themselves in diverse projects within the same organization, which could be influenced, for example, by the value frame of the functional department, or project manager.

Although the outcomes of innovation are affected by the behaviour of individuals (Brown and Eisenhardt, 1995), we found little in the literature on the role of individuals in stakeholder engagement, particularly within external stakeholder groups. A few papers emphasized the role of senior management and boundary spanners (Arenas et al., 2011; Hoffmann, 2007; Holmes and Smart, 2009), but the role of organizational members in sustainability innovation, individually and collectively, also merits more research.

Systematized learning. Our second contribution identifies the interconnected higher order integrative capability of ‘systematized leaning’, which corresponds closely with Zollo and Winter's (2002) notion of ‘deliberate learning.’ Although dynamic capabilities arise from learning, learning mechanisms that are themselves systematic can be regarded as (following Collis 1994) "second order" dynamic capabilities (Zollo and Winter, 2002). If firms can ‘systematise’ what they learn from value framing activities on individual innovation projects by sharing that learning across the organization and reconfiguring their human and capital resources accordingly, then the organization is ‘learning to learn’ and enabling the continuing development of its stakeholder engagement capabilities.

This aligns with the notion in the dynamic capabilities literature of how relational capabilities are developed at the organizational level. A relational capability is a type of dynamic capability “with the capacity to purposefully create, extend, or modify the firm’s resource base, augmented to include the resources of its alliance partner” (Helfat et al., 2007, p. 66). Researchers argue that systematic approaches are required to translate “raw experience” into relational capabilities - “active learning processes using systematic ways of developing people and gaining tacit knowledge, followed by knowledge codification and internalization are important elements in the development of relational capability” (Helfat et al., 2007, p. 72).

Further research is needed into how organizations institutionalize what they learn about engaging with stakeholders for sustainability innovation, and particularly whether the ability for an organization to learn from stakeholder engagement depends on the value frame, or value framing capability of the function which leads the engagement with that stakeholder. Organizations which have a value framing capability may be better placed to develop a systematized learning capability because they continuously question and improve the way they engage with stakeholders and attempt to institutionalize what they learn. This link between value framing and systematized learning could also be further explored.

Interplay between integrative and functional capabilities. Our third contribution is to posit a two-way interaction between functional and integrative capabilities, rather than depicting them as individually contributing to sustainability innovation outcomes. Some integrative capabilities are functionally led: for example, members of sustainability teams would usually participate in external networks addressing environmental issues. Other activities that might traditionally be led by more centralized functional teams, such as a customer focus groups conducted by the marketing team, could also be conceptualised as externally integrative (with customers), as well as potentially being internally integrative if the resulting insights are shared with other functions.

We observe that although in many organizations the ‘sustainability function’ is a centralized functional team (CSR, environment or sustainability team), it is also a distributed capability which is located within other departments across the organization, which takes the form, for example, of steering groups or working groups composed of representatives from multiple functions, or ‘green champions’ embedded in these departments. As such, the field based experience of the authors suggests that sustainability teams are currently leading the development of integrative capabilities.

We suggest that organizations could improve their stakeholder engagement by focusing on the enhancement and development of integrative capabilities within their marketing and innovation functions. In particular in relation to marketing, the sustainability marketing literature argues that the marketing function plays a significant role in sustainability innovation (Sharma et al., 2010;

Sheth et al., 2010; Vargo and Lusch, 2004), only a handful of papers in our review research the relevant marketing capabilities required (Mariadoss et al., 2011; Polonsky et al., 1998; Pujari et al., 2004). There is a need to research whether and how the marketing function can exploit its traditional capabilities to enable sustainability innovation, both in relation to customers and potentially a broader range of stakeholders.

Aligned to this, and relating back to our findings on value framing capability, the authors' field experience suggests that different internal functional teams can operate distinct, and potentially competing value frames, and therefore should be considered as internal stakeholders between whom a value framing capability also required.

Managerial implications

Organizations must consider not only which external stakeholders they engage with and how to manage these interactions, but just as importantly, how to assimilate, interpret and learn from these engagements internally. In many organizations, stakeholder engagement activities are siloed. The sustainability team will lead the organization's engagement in cross industry environmental networks and manage partnerships with NGOs. The marketing team own customer relationships and are expert in gathering insight, but may not consider early stage research on more sustainable products to be a priority. The investor relations team deal with shareholders, and may not pass on signals about the priorities of responsible investors to others in the organization. R&D and innovation teams may be service providers to brand teams, and therefore not be free to respond to the sustainability trends they identify from competitors, suppliers or entrepreneurial innovators.

Efforts are being made to achieve integration at board level through governance structures. However, this internal integration process needs to extend down the organization with the integration of traditionally functionally-led activities across other parts of the business – for example including objectives for packaging reduction (sustainability team led) in a product selection process (commercial buying team led) for a retailer in the case of Argos (personal communication).

Firms need to be conscious of the potential for competing value frames to exist between different functional groups within the firm, and find ways to navigate these differences in order to achieve a common understanding and interpretation of the insight sourced from external stakeholders and what it means for the organization. Similarly, an organization's external stakeholder engagement must be an ongoing process for it to achieve true mutual understanding and learning. Many firms carry out periodic consultation exercises, often outsourced to specialist sustainability consultancies, which involve short conversations with representatives from various stakeholder groups to identify the range of stakeholder issues facing that organization. For many firms this has developed into the formation of stakeholder panels or advisory boards who sit perhaps bi-annually to review the organization's sustainability progress. However, this still does not amount to the 'relational work' required to collaborate for systemic change (Senge et al., 2007). It is the investment in this relational work which allows differences in value frames between firms and stakeholders to be understood and reflected on, and for new ways of understanding and doing to be mutually created.

CONCLUSIONS

This research responds to calls to better understand how firms can effectively integrate stakeholder perspectives into their innovation processes, particularly in the context of sustainability innovation. Our review has synthesized existing knowledge in this field using a capability-based framework developed from prior resource-based product development work, and applied to a sustainability context. As we would expect, some of the answer to our question of 'How do firms engage with their stakeholders for sustainability innovation?' can be explained in terms of the structures and processes an organization puts in place to manage its stakeholder interactions. However, this needs to be complemented with the cultural alignment and relational work required to understand, and harness the differences in the values, objectives, motivations and competencies and of different stakeholder groups, together with a way of translating learning on an individual and team level on how best to do this to the organizational level. This points to a need for more

field research on the two higher order integrative capabilities revealed by this research - value framing and systematized learning.

Our framework was informed by a rigorous review of the literature relating to stakeholder engagement in sustainability innovation. However, since this context was chosen as representative of the challenges posed by broadening our thinking about innovation to include a more extensive and diverse set of external, and internal, stakeholders it is useful as an organizing framework for further research on integrating innovation from external sources in other contexts.

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* denotes articles included in the systematic review referenced in this paper. Not all 97 articles have been referenced. A full list of articles reviewed is available on request from the author.

TABLE 1
Search strings

Theme	Search string
Sustainability	(sustainab* OR environmental OR green OR ecolog* OR CSR OR “corporate social responsibility” OR “social* responsib*” OR “corporate social performance” OR eco-innovation OR “green technology” OR renewable* OR remanufacture* OR “triple bottom line” OR eco-efficien* OR eco-effectiv* OR SDI OR eco?centric OR biomimicry OR “beyond greening” OR “frugal innovation” OR “reverse innovation” OR “circular economy” OR “closed-loop” OR “life-cycle analysis” OR “cleaner production” OR “trickle up innovation” OR “cradle-to-cradle” OR “social innovation” OR “bottom of the pyramid” OR BOP OR ISO 14001)
Innovation	(innovat* OR R&D OR “research and development” OR invent* OR “product development” OR “new product development” OR NPD OR “value proposition”)
Stakeholder	(stakeholder* OR consumer* OR customer* OR user* OR supplier* OR competitor* OR partner* OR communit* OR regulator* OR policymaker* OR government OR NGO* OR “non-governmental organi?ation” OR media OR employee* OR director* OR department* OR investor* OR entrepreneur*)
Engagement	(engagement OR interaction* OR marketing OR “relationship management” OR collaborat* OR cooperat* OR co-operat* OR co-creat* OR co-produc* OR “open innovation” OR “user innovation”)

TABLE 2
Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Study type	Empirical and theoretical/conceptual studies. Peer reviewed; working /conference papers included if high quality	Articles from journals with an impact factor of <1
Language	English	Any other language
Sector	Private sector; can include private sector firms’ engagement with public sector	Any study which does not include consideration of private sector firms
Date	1970 to 2014	Any study published before 1970
Relevance	<ul style="list-style-type: none"> • Sustainability innovation management • Addresses sustainability innovation and stakeholder engagement processes • Level of analysis – firm level practices and processes • Innovation consistent with environmental sustainability (can also include social and economic sustainability) 	<ul style="list-style-type: none"> • Not directly relevant to the research question – e.g. sustainability only in the sense of continuance; environment not relating to the natural environment • Level of analysis – not firm-level practices and processes (e.g. community initiatives/activities) • Innovation consistent with social but not environmental sustainability • Technical research on manufacturing/supply chain

TABLE 3**Journals with two or more articles in the review**

Journal title	No. of papers
Journal of Cleaner Production	19
Business Strategy & the Environment	12
Journal of Product Innovation Management	5
Journal of Business Ethics	4
MIT Sloan Management Review	4
Industrial Marketing Management	4
Corporate Governance: The International Journal of business in society	4
European Journal of Innovation Management	3
Ecological Economics	2
Industry & Innovation	2
Journal of Industrial Ecology	2
Journal of Marketing	2
Journal of Marketing Management	2
R&D Management	2
Research Policy	2
Technovation	2
	71

TABLE 4**Paper by type of stakeholder**

Stakeholder type	No. of papers
External stakeholders	66
Users/Consumers	11
NGOs/NPOs	8
Suppliers	7
Government / regulators	4
Community	3
Regional networks	3
Universities	2
External - general	28
Internal stakeholders	31

TABLE 5: External integrative capability

	Author	Stakeholder	Finding
Building bridges	Hansen & Grosse-Dunker, 2009	General	The social effects of innovation can be accurately assessed by means of panels of experts, stakeholder dialogues, stakeholder advisory boards
	Holmes & Smart, 2009	NGOs/NPOs	There are two types of boundary-spanning roles: 1) formal responsibility from senior management to 'manage' innovation opportunities 2) 'conduit' to facilitate search and exploration to locate opportunities for innovation through ideas exchange
	Holweg, 2014	Government	A permanent forum for government-industry exchange can be successfully established; the joint creation of roadmaps provides a joint statement that helps government guide its policy and firms to reduce uncertainty about future policy
	von Malmberg, 2007	Regional networks	Local authorities' (LA) role in actor networks related to regional sustainable development are either teacher (they hold knowledge, information and ideas and transfer it to companies) or tutor (put companies in touch with consultants and technical experts)
	Murphy & Arenas, 2011	Community	"Collaborations tend to enjoy more success when respected and independent third-party organizations are involved as facilitators and capacity builders" (p. 114)
	Triguero et al., 2013	Knowledge institutes	Collaborative networks with research institutes, agencies and universities are essential to drive all types of eco-innovation
	Roy & Whelan, 1992	Suppliers	The environmental impact of products can be managed through the creation of an 'issue-based' network. There should be equal representation of partners with equal financial contribution
	Stafford et al., 2000	NGOs/NPOs	If firms rely on a green NGO acting as a strategic bridge between a firm and its environmental stakeholders, then the timing of the goal achievement of the two parties is critical
Managing engagement	Bartlett, 2009	Community	Community profiling (e.g. census information, official stats, mapping & geo-data, interviews and surveys) can "go beyond the 'surface meaning' of consultation data in order to uncover the 'hidden' wants and needs" (p.413)
	van Bommel, 2011	Suppliers	Cooperation in supply networks is characterized by trust, reputation, joint programmes and cooperative information systems
	Driessen & Hillebrand, 2013	General	Stakeholder issue identification for 'market' stakeholders include focus groups, store checks, user observation studies. For 'nonmarket' stakeholders: monitoring of regulation, dialogue with special interest groups (SIGs), SIGs as advisors
	Jamali et al., 2011	General	The more innovative partnerships reported different patterns of engagement: regular interactions, open lines of communication; nurturing over time a strong cooperative competence building on trust, communication and good coordination
	Heiskanen & Lovio, 2010	Users	User involvement can help to enhance the acceptance of low-energy solutions. The project could have been improved had users been involved more intensively, and use been made of user participation in communication about the project
	Hoffmann, 2007	Users	Success factors for consumer contribution to sustainable product development include: an open company attitude, senior management support, clearly defined roles and tasks, creative techniques, small working groups, direct communications, non-hierarchical dialogue and flexible moderation
	Kourula & Halme, 2008	NGOs	Different CR types involve different forms of cooperation: Philanthropy: sponsorship, employee volunteering; CR integration: dialogue, common programs, partnerships, consultation, research collaboration; CR innovation: common programs, partnerships
	Liao et al., 2013	Users	Innovative methods are needed to encourage consumer participation in designing sustainable products that satisfy their needs, since methods to identify product eco-design issues (e.g. LCA) mainly focus on environmental aspects not customer needs

	Mathur et al., 2008	General	Key requirements for collaborative process: arenas accessible to all those with a stake; transferring power to make decisions close to those stakeholders who will be affected by them; engagement methods which allow diverse points of view to be explored
	McDonald & Young, 2012	NGOs	Leadership effectiveness, communication and trust are success factors for cross-sector collaboration. Supporting factors are: government support, employee support, interaction or engagement opportunities and evaluation when planning and monitoring
	Sakao & Fagnoli, 2010	Users	"Methods developed for eco-design have been relatively poor at addressing the customer aspect" (p.529)
	Senge et al., 2007	General	Successful collaboration efforts embrace three interconnected types of work - conceptual, relational and action driven, which form a learning ecology for systematic change. <i>Relational work</i> : Reflective conversation and working with mental models
	Slotegraaf, 2012	Users/ suppliers	Businesses are developing strategies for using technology and networks to leverage input from consumers and suppliers in seeking ideas and developing new products
	Spena & De Chiara, 2012	Suppliers	A more collaborative approach with suppliers fosters creativity and innovation (through inclusivity and diversity). Specific mechanisms and processes are identified
	Verghese & Lewis, 2007	Suppliers	Environmental innovation in industrial packaging requires: an effective project champion; senior management/CEO support; communication and engagement with partners; relevant data upfront (e.g. LCA); an open mind; initial financial investment and the identification of multiple benefits
	Lee & Kim, 2011	Suppliers	Two important factors for green innovations are coordination and alignment of project teams (e.g. monitoring and evaluation, learning from each other, sharing experiences and information), and effective communication with suppliers
	McDonald & Young, 2012	NGOs	"Cross-sector relationships can progress along a collaboration continuum so long as partners reassess their needs and expectations and choose to continue to innovate" (p. 65)
	Verghese & Lewis, 2007	Suppliers	Environmental innovation in industrial packaging requires alignment of environmental objectives with business strategies; involvement of important stakeholders at beginning of project; clear and shared objectives for functional requirements and redesign objectives
Achieving alignment			

TABLE 6: Internal integrative capability

	Author	Finding
Engaging employees	Bos-Brouwers, 2010	The time and support employees receive to elaborate on innovative ideas, combined with the effort and ambitions of the owner/ manager are important
	Bocken et al., 2014	Teams should be multidisciplinary and creativity and environmental knowledge are essential. Eco-innovation is a "collective endeavour" (p. 52) between top management and R&D (highest involvement), marketing, sales, engineers and designers
	Kiron, 2012	Strong support from Chairman & CEO, global strategic leadership team, four business units and an external sustainability advisory board have been crucial to building and meeting aggressive sustainability metrics [Kimberley-Clarke]
	Kiron et al., 2013	The factors associated with getting economic value from sustainability activities include top management support
	Knowles & Espinosa, 2009	"The commonly used strategy of placing the environmental responsibility upon certain departments, rather than on the entire organization, can deadlock the authority of the EMS as other departments can simply continue to place the blame on one another rather than themselves" (p. 287)
	Kruschwitz & Pflueger, 2012	"Reporting into marketing gives us better understanding of the connections between sustainability-related issues and brand value and brand equity. We have better access to tools and more access to information that help us understand what we can do that our customers need, as well as connections into the analyst and stakeholder community" (p. 4) [Dell]
	Lenox & Ehrenfeld, 1997	Communicative linkages e.g. Incorporate sustainability directly into product development (integrated product development teams)
	McDonald & Young, 2012	Leadership effectiveness, communication and trust were verified as success factors for cross-sector collaboration. Variables which support evolution include employee support
Using environmental data	Dangelico & Pujari, 2010	A key challenge to integrating environmental sustainability is management of information flows and coordination of resources within and outside of the product development team
	Favi et al., 2012	An innovative web-based software platform can facilitate the involvement of multiple competences distributed in companies along the supply chain
	Gmelin & Seuring, 2014	Successful collaboration is dependent on technology and organized processes. Tools, inter-operability standards, architectures etc. have to be co-ordinated so that barriers do not prevent collaboration
	Guiltinan, 2009	"Many new processes and technologies have been developed for the cross-functional communication process in firms where sustainable new product development is a priority (e.g. "design for environment," "life cycle assessment)
	Hallstedt et al., 2010	The key ways to improve sustainability integration between senior management and product development include a standardized toolbox for sustainability-related information in decision processes
	Horbach, 2008	Environmental management tools are important for the introduction of environmental product innovations
	Könnölä & Unruh, 2007	While environmental management systems (EMS) may initially produce improvements in environmental performance, EMS may also constrain organizations' focus to the exploitation of present production systems rather than exploring for superior discontinuous innovations
	de Kraker et al., 2013	Social network software platforms did support users in their network interactions, particularly keeping other users informed, sharing experiences and information and collaborating on joint document. However, social media functionality was not used much (e.g. profiles, sharing, likes, tagging)
	Lenox & Ehrenfeld, 1997	Communicative linkages e.g. training in environmental design to designers; technical systems (databases, design aides; use of gatekeepers)

	Pujari et al., 2004	"Cross functional integration enhances the diffusion of market and customer knowledge among all members of a project team, not just during development, but also at later stages of test marketing and commercialisation (p. 383)
	Slotegraaf, 2012	Businesses are developing strategies for using technology and networks to leverage input from consumers and suppliers to seek ideas and develop new products
Integrating sustainability	Ayuso et al., 2011	"Generally stakeholder engagement and innovation tend to be managed as parallel but not interconnected processes within different business functions" (p. 1412)
	Carrillo-Hermosilla et al., 2010	It is important for functional sectors such as R&D, marketing and operations to act together in an integrated way with external stakeholders to develop successful environmental sustainable product innovation
	Driessen & Hillebrand, 2013	Coordination mechanisms such as stakeholder management systems, guidelines, norms and procedures concerning the inclusion of green issues in NPD procedure; high level of informal communication, environmental champions, inclusion of all departments in the assessment of green issues
	Guiltinan, 2009	"Design decisions at the individual product level have to be consistent with the firm's strategic priorities on positioning and growth objectives" (p.24)
	Hallstedt et al., 2010	The key ways to improve sustainability integration between senior management and product development include relating long-term strategic sustainability challenges to short term tactical business challenges, and incentive and monitoring system to implement sustainability measures
	Knowles & Espinosa, 2009	Most methodologies and practices for environmental management do not adopt a holistic perspective, causing significant problems in implementation from inadequate structures and communication channels
	Lenox & Ehrenfeld, 1997	Communicative linkages e.g. Incorporate sustainability directly into product development (integrated product development teams); training in environmental design to designers; technical systems e.g. databases, design aides; use of gatekeepers
	de Medeiros et al., 2014	Inter-functional collaboration is a key success factor for environmentally sustainable product innovation
	Pujari, 2006	The market performance of green products was enhanced where there was "cross-functional co-ordination between new product development professionals and environmental specialists" (p. 76)
	Pujari et al., 2003	Significant relationships between the market performance of environmental NPD and independent factors such as environmental benchmarking and performance measurement processes, effective environmental database management, effective groundwork, and cross functional coordination
	Pujari et al., 2004	"To foster environmental product innovation, environmental impact analysis should be integrated with marketing practices like market research ... help identify product characteristics capable of satisfying customers and enhancing the firm's competitiveness" (p.383)

TABLE 7: Value framing capability

	Author	Finding
Thinking systemically	Czinkota et al., 2014	"The rules in the global business arena need to change: brand managers, supply chain members, consumers and stakeholders, must become co-operating gladiators to arrive at the best possible practices and grow a sustainable brand" (p. 91)
	Guiltinan, 2009	More sustainable design practices can be developed but cultural changes at the product design level are likely to be somewhat constrained by corporate and marketing realities and perceptions
	Holweg, 2014	The forum required firms to shift their attention away from individual company needs and toward the collective needs faced by all industry players; from specific firm-level subsidies to the strengthening of the UK automotive industry as a whole
	Lenox & Ehrenfeld, 1997	"Traditionally, environmental issues have been buffered from the design and manufacturing functions. Consequently, attitudes develop which treat environmental issues as not being of concern" "The challenge to firms is to break down the 'thought worlds' of functional groups and to create enough mutual understanding to effectively communicate information" (p. 191)
	Pujari et al., 2003	"Responding to sustainability challenges in industrial NPD is more likely to be hampered by organizational barriers than technical/process barriers" (p. 389)
	Senge et al., 2007	Commercial interests and proprietary know-how must be balanced with public interest when tackling systemic issues. This means "focusing on issues that are larger than individual organizations and improving the related systems that can benefit all" (p.52)
Empathizing	Aschehoug et al., 2012	There is a substantial gap between environmental information (EI) available and what the firm knows. Culturing framing and filtering mechanisms were observed
	Delmas & Toffel, 2004	"Pressure is managed according to the cultural frame of the unit that receives it" (p. 215). The way in which managers perceive and act on stakeholder pressure depends on company specific factors
	Hoffmann, 2007	Consumers had significantly more learning success [from contributing to sustainable product development] than the company, whose moderate learning results are explained through filtering mechanisms that constrained the company to certain information
	Holmes & Smart, 2009	Cross sector partners are "driven by very different concerns and operate according to different sets of values and cultures" (p. 395)
	Murphy & Arenas, 2011	Principles for cross-cultural bridge building include: Respected individuals as representatives, strong communication skills and culturally literate, empathetic, open minded boundary spanners
	Senge et al., 2007	Successful collaboration efforts embrace three interconnected types of work - conceptual, relational and action driven, which form a learning ecology for systematic change. Relational work: Reflective conversation and working with mental models
Hybridizing	Le Ber & Branzei, 2010	Partners initially contrast their sector-embedded diagnostic frames (divergent understanding of the problem) and then work together to deliberately develop partnership-specific prognostic frames (understanding of possible solutions)
	Bönte & Dienes, 2013	There is a "not invented here" syndrome (Katz and Allen 1982) associated with external partnerships
	Driessen & Hillebrand, 2013	"Acknowledging tension between stakeholder issues is the first step toward reaching consensus within the team" (p. 372). Creating a culture where green issues are regularly discussed in NPD meetings
	Mathur et al., 2008	A democratic approach values the process of participation for the ethical issues of equity and empowerment of citizens. The desire to engage with stakeholders in project decision making processes is also linked to enhancing the sense of ownership of a project
	Poncelet, 2001	"Conflicting interests, values, and world views with which all these actors approach current natural resources and environmental quality issues" (p. 13)

TABLE 8: Systemized learning capability

Author	Finding
Ayuso et al., 2006	Capabilities for generating organizational innovations in accordance with stakeholder needs include 'stakeholder knowledge integration'
Ayuso et al., 2011	"Knowledge sourced from engagement with internal and external stakeholders contributes to a firm's sustainable innovation orientation, but that this knowledge has to be managed internally in order to be converted into new ideas for innovation" (p. 1399)
Blum-Kusterer & Hussain, 2001	The co-evolutionary (learning) approach to innovation (i.e. firm's norms, routines and past experiences are influential) versus the neo-classical (i.e. firms only respond to profit signals) better captures the complexity of the corporate eco-change process
Chang & Lin, 2014	Internal and external collaboration have a positive effect on performance of green innovation. In the process of cross-functional collaboration, a high level of knowledge sharing strengthens performance but a high level of external acquisition weakens such performance. In the process of external collaboration, knowledge acquisition has a positive effect but a high level of internal knowledge sharing weakens performance
De Marchi et al., 2013	Proactive green innovators have different knowledge strategies as compared with reactive ones: they have higher R&D intensity and carry out more training as well as interacting with more and more diverse external stakeholders
Driessen & Hillebrand, 2013	Organizations learn to integrate multiple stakeholder issues over time by accumulating experiences. It is difficult to build overnight or copy from others.
Horbach, 2008	The introduction of new or relevant changes of organizational structures are especially important for environmental innovations
Klewitz & Hansen, 2014	Interaction for sustainability-oriented innovation is an enabling mechanism which leads to learning and innovative capacity building in SMEs that ultimately translates into innovation at the product, process and organizational level
Quist & Tukker, 2013	There are three types of innovation positioned on two axes of: 1) Who learns: Small groups of niche actors to actors making up societal systems and 2) What type of learning: 1st order (incremental) to 2nd order (radical). Innovation types are: 1) Niche / local experiments 2) Optimization /redesign and 3) System innovation

FIGURE 1
A capability-based framework for engaging stakeholders in sustainability innovation

